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ABSTRACT

Using test results to align curriculum was studied in two applications with Chapter 1 programs. Curriculum alignment is the process of coordinating instruction so that a particular curriculum builds on skills students have learned in previous courses while providing skills for future success. In using test results for program improvement, disaggregating district and state-wide data were used. Steps in conducting curriculum alignment were: (1) form a school-wide committee for each content area; (2) develop lists of objectives for regular and Chapter 1 programs; (3) review tests and group-related items, forming skill clusters as links between regular and Chapter 1 programs; (4) link test objectives to related program objectives; (5) establish minimum passing levels; (6) organize test results and disaggregate data to classify it into skill clusters; and (7) interpret results for programs of interest. The process was applied in a semi-rural district of 2,000 students and a suburban area of 4,800 students, both in upstate New York. In both districts, disaggregation indicated areas in need of further study. Program improvement followed the curriculum alignment process. Twelve tables provide test results, curriculum objectives, and disaggregated scores. (SLD)

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Presented at the AERA Annual Conference, April 1988

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INTRODUCTION

In the last five years or so, Chapter 1 programs have seen a changing emphasis with regard to the use of evaluation data and test results. Until recently, it was enough for Chapter 1 programs simply to aggregate test results in order to describe whether Chapter 1 students were learning more than would have been expected had they participated only in the regular classroom program. These test results were used primarily to describe how much additional learning occurred for students who participated in Chapter 1 programs. But now Chapter 1 professionals are being encouraged to use evaluation data in new and more useful ways. The emphasis is moving away from simply collecting and reporting data and toward the use of those data specifically for program improvement.

Spearheading the initiative to use evaluation data more effectively is a growing number of state education agencies. New York, Louisiana, Michigan, and Vermont are among those states whose education departments are currently in the process of developing and implementing statewide evaluation-based program improvement activities aimed specifically at remedial and other types of specially funded education programs. Through a wide variety of state-initiated activities, local school districts in these states are learning about new ways to use evaluation data to better understand the teaching and learning that occurs in remedial and regular classroom programs.

One key aspect of program improvement is that of curriculum alignment -- the process of coordinating instruction so that a particular curriculum builds upon those skills students have learned in previous courses, and also provides skills fundamental to achieving future success. Ideally, in order to obtain maximum instructional effectiveness, a school district should ensure that curricula are aligned across all grades and special programs. In the case of Chapter 1 programs, curriculum alignment is the process of ensuring that students are provided with instruction that takes into account their entry level skills, as well as providing instruction in the skills which they will need for success in the regular classroom program. (Although the focus here is on Chapter 1, the process of curriculum alignment across regular classroom programs and any "special" programs should be of interest to all school districts.)

Curriculum alignment through the process of "disaggregating" district and state-wide evaluation data is now a focus of major interest in the arena of using evaluation results for program improvement. Those involved in the field of evaluation, as well as Chapter 1 project managers, now realize that simply aggregating and reporting data to meet various state

and federal evaluation requirements is merely touching the surface with regard to using test results. For program evaluation purposes, the next and most critical step is test data disaggregation -- that is, analyzing test results by taking them apart into their various components.

The disaggregation process can proceed along a variety of lines, depending upon the interest of those involved. For example, many Chapter 1 programs are interested in disaggregating data to identify skills that students who have left the program are lacking in comparison to their peers who did not receive Chapter 1 services. On a school-wide basis, disaggregation can be used to improve curriculum alignment across programs; that is, the process of pulling apart test results can be used specifically to better align and coordinate instructional goals and objectives across all types of programs at all grade levels.

Concurrent with the emphasis on using data for program improvement has been a renewed emphasis on research related to characteristics of effective programs. A nationwide initiative from the Chapter 1 program office of the U.S. Department of Education[1] (1984) has identified 13 attributes from the effective schools research as critical to the successful functioning of any Chapter 1 program. The process of curriculum alignment through test data disaggregation has direct implications for 5 of the 13 attributes, including:

- **clear project goals and objectives** - the process required for curriculum alignment begins with the identification of measurable program goals and objectives;

- **coordination with regular and other special school programs** - the process of curriculum alignment is one which involves school-wide committees for each content area, fostering communication across programs;

- **strong leadership** - the commitment to the curriculum alignment process and the activities within provides a way for the school administration to demonstrate their support for program improvement;

- **appropriate instructional materials, methods and approaches** - while the process of curriculum alignment does not directly improve this area, the results can and do identify objectives which are being taught in the program, yet are not being mastered -- pointing to possible problem areas which should be investigated more thoroughly;

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[1] Goal Based Education Program (1984). Effective Schooling Practices: A Research Synthesis. Portland, OR: Northwest Regional Educational Laboratory.

- **o evaluation results used for program improvement** - the process of curriculum alignment demonstrates to those involved that evaluation results can be used for much more than simply reporting purposes -- that evaluation results can be used for program improvement both within specific programs and on a school-wide basis.

In addition to being directly related to these attributes of effective schools, the curriculum alignment process can affect other key attributes, such as professional development, high expectations for student learning, and promoting a positive school climate.

Establishing a process which has as its basis test data collected for federal, state, or local purposes, yet focuses on attributes known to contribute to the development of effective programs, results in a viable approach to program improvement. The process itself promotes staff involvement in school improvement activities. Results of this particular curriculum alignment process can point directly to specific aspects of the program -- areas which can subsequently be changed in order to increase student performance.

THE FRAMEWORK FOR CONDUCTING THE CURRICULUM ALIGNMENT PROCESS

The process of using test results for curriculum alignment subsumes three basic premises and requires the implementation of seven steps. The basic premises are that:

(1) The district administration supports the school improvement process by providing the time and resources necessary for conducting the required steps;

(2) the district curricula is articulated in some type of written form, either in the form of school-based objectives, district-wide skill clusters, state syllabi, or some other type of defined format; and,

(3) the district uses some type of standardized norm-referenced or criterion-referenced test results with relevance to the skills taught in the program, and that test results are available to the curriculum alignment team for various analysis procedures.

Administrative support is a requirement simply because the use of test results for curriculum alignment is a time-consuming process which requires the cooperation of staff across programs. If a disaggregation process for the purpose of curriculum alignment is to succeed, staff from the different programs must have time to work together in order to complete the various steps involved. The administration must be willing to provide that time as part of the school activities. Resources, such as the technical support required to conduct the various steps, must also be provided. Unless the administration is willing to provide the necessary leadership and support,

it is likely that the process will not succeed.

The need for some type of written curricula for the program(s) of focus is required simply because, in order for any elements of curriculum or instruction to be aligned, one must be able to define those elements in some reasonable fashion. The disaggregation process, as will be described in detail in this paper, rests on data gleaned from the relationship between skills taught in the program(s) and test results.

Obviously, curriculum alignment through the use of test results cannot occur unless there are test results which can be analyzed in the requisite manner. Additionally, these test results must be available for individual students. However, these test results cannot come from the administration of just any test. The test must in fact be a norm- or criterion-referenced test which meets the basic psychometric qualities of reliability and validity. Furthermore, the test used must measure objectives or skill clusters of relevance to the targeted program(s). For example, if a Chapter 1 program does not teach mathematics skills, it makes no sense from a curriculum alignment perspective to use test results from a standardized mathematics test administered at the school or district level.

STEPS FOR CONDUCTING THE CURRICULUM ALIGNMENT PROCESS

Step 1: Form a school-wide committee for each content area of interest.

The first step in the curriculum alignment process is to form a committee consisting of representatives from each of the content areas of interest (e.g., mathematics, reading, language arts). Both the Chapter 1 and the regular school program should be represented on the committee, along with any school-wide or district curriculum and/or evaluation specialists. Committee members should be provided with an overview of the entire process and its importance with regard to program planning and improvement. The members of this committee must be able to meet and work together on a regular basis to accomplish the actual alignment activities. Before beginning any of the activities, however, committee members should be made aware of the fact that the process of curriculum alignment and program evaluation is a time-consuming activity and requires a major commitment on their behalf.

Step 2: Develop two lists of objectives.

Once the committee has been formed, its first task is to obtain lists of objectives or defined skills which are taught in each program and content area of interest. For purposes of curriculum alignment between the regular and Chapter 1 programs, the committee would need to obtain a list of objectives, or skill clusters, for both the regular school program and the Chapter 1 program, appropriate for each content area under consideration. Ideally, these lists will already have been developed during previous program development activities, as part of school-wide planning initiatives, or as part of district or state-wide mandated curricula; in which case the committee's task is simply to obtain lists of the objectives. If the objectives do not exist, however, the committee is then faced with a more difficult task: clarifying what is actually being taught in the various programs -- which is, of course, a curriculum development activity essen-

tial in and of itself.

Each content area list (e.g., one list for the regular language arts program and one list for the Chapter 1 language arts program) should include:

- o a summary statement for each objective or skill (e.g., multiply two-digit numbers with carrying; identify simple nouns in a short sentence);
- o some type of code number or reference number assigned by the committee to each objective or skill in each of the programs and content areas of interest (to be used at a later point in the alignment process); and
- o an indication of approximately when each objective or skill is taught in each program (e.g., grade 2, fall; grade 3, spring; grade 3, September). Note that in the Chapter 1 program, one might expect more variety, depending upon the level of individualization used when providing instruction.

In regard to the third requirement, it is important to have some clear indication of when each objective/skill is actually taught to students. This information, as will be demonstrated later, is critical for the process of interpreting the results of the data disaggregation and for later curriculum alignment activities. It should also be noted that, if all members of the committee are not extremely familiar with the program and curriculum, they may find it helpful to attach statements of the actual objectives for future reference.

Step 3: Review the test and group related items.

The next task for the committee is to review the actual test items appropriate to the content area, and then group related items by test objective or skill cluster. In many cases, much of this work can be avoided if a standardized norm- or criterion-referenced test is used to provide the test results. Typically, in these cases, the test developer will have already conducted this activity by assigning individual test items to specific skills, then grouping skills into skill clusters. However, even if this information already exists, the committee should review the groupings to ensure that it agrees with how the test publisher organized the skills. If the committee does not agree with the publisher's information, then it should make the requisite changes regarding the manner in which items are grouped into related objectives or skill clusters.

Each objective or skill cluster assessed by the test should also be assigned a code number. These code numbers should take a slightly different form than those the committee assigned to the instructional objectives (e.g., 1, 2, 3 instead of A, B, C), since these codes will eventually be used in conjunction with the codes assigned to the instructional objectives. The assessment objectives or skill clusters are the link between the regular program and Chapter 1 instructional objectives, and therefore form the basis for reviewing curriculum alignment. It is imperative that

representatives of both the regular and Chapter 1 programs work together to develop the listing of assessment objectives. This helps ensure that all committee members understand the manner in which test results will eventually be interpreted in terms of objectives or skill clusters.

Step 4: Link test objectives to related program objectives.

Using the lists of regular program and Chapter 1 objectives, along with the listing of test objectives and their respective code numbers, the committee should link each test objective to the related program objective by writing the appropriate test objective code number next to each program objective. Depending upon the specificity of the objectives and skill clusters used, this step may require some level of committee discussion in order to reach a consensus. It may not always be clear as to which regular program or Chapter 1 objectives should be matched to which test objectives. Where this is unclear, the committee must rely on its best judgment and content expertise to come to a consensus. The results of this step indicates the congruence between objectives or skills clusters assessed on the test and the objectives taught in both the regular and Chapter 1 programs.

Step 5: Establish the minimum passing level for the test and for each objective or skill cluster.

The next task for the committee is to establish a "minimum passing level" for the entire test and for each objective or skill cluster of interest. The passing level for the test will be used simply as a basis for grouping students into mastery/non-mastery for the overall test based on their total raw scores. Similar criterion levels should be set to determine whether individual students mastered or did not master each objective or skill cluster of interest. Here, too, raw scores (number or percent correct), should be used to classify each student's success on each of the assessment objectives or skill clusters of interest to the committee.

If a state-wide or district-wide test is used and there exists a recommended cut-off score for that test, the committee should consider using that score. However, the committee should not feel constrained to use it if it believes that the score is set either too high or too low. The cut-off score used should in fact reflect the minimum standards that the committee feels students should attain in order to be classified as having passed or not passed both the overall test and its individual objectives or skill clusters.

Step 6: Organize test results and disaggregate data.

The sixth task is to arrange for the test results to be analyzed. (The assumption here is that the test has already been administered to all students on a school-wide, district-wide, or state-wide basis.) Test results for the entire group should first be scored as follows:

- o **For each student,** each item is scored as either correct or incorrect and a raw score indicating the total number of items correct should be obtained.

- o **For each student,** a determination of passing/not passing is made for the overall test and for each objective or skill cluster (remember that this determination is based on a preset criterion, established in Step 5);

Next, the test results are analyzed as an entire group, including all students who have taken the test. This is where the disaggregation process begins and is accomplished as follows:

- o Using all total test scores, calculate the range of the obtained scores.

- o Determine the midpoint for that range, with scores falling below the midpoint of the range going into the bottom half and those scores at or above the midpoint going into the top half.

As with setting the criterion levels, using the range of total scores and its midpoint is an arbitrary approach for disaggregating the data. If the committee prefers to disaggregate in another manner, it should feel free to do so, as long as the approach used is a consistent one. For example, the committee may choose to simply identify the lowest scoring 50% of the students for disaggregation purposes. Or, it may choose to disaggregate using the range, but only look at those students who scored in the bottom third of the spread of scores. Other, more sophisticated statistical approaches could also be used to determine a basis for disaggregating test scores, but in many cases, such approaches are not easily implemented in school committees of this nature.

At this point the disaggregation process focuses on data from all students whose total raw scores fall into the top scoring group (e.g., top half, top third, top two-thirds). Using all of the students in this group, the committee determines the percent of students passing each test objective or skill cluster. More specifically, for each objective or skill cluster, the total percent of students who passed that particular area is calculated. (The determination of what constitutes mastery has already been made using the minimum passing levels established in Step 5 and, at this point, each student's test results have already been classified into mastery or non-mastery categories for each objective or skill cluster.)

Once all of the data for students scoring in the top half (or third) of the spread of scores have been disaggregated and classified by objective/skill cluster, the same disaggregation process is repeated for those students who scored in the bottom half (or third) of the spread of scores. Again, for each objective or skill cluster, the committee calculates the total percent of students who passed each area of interest.

Once the data have been disaggregated into these two broad score ranges, the curriculum alignment process then focuses more specific attention on those students whose total scores fell into the bottom half of the distri-

bution of scores. These data are then further disaggregated in terms of the regular program and, in this case, the Chapter 1 program. At this point, test scores are analyzed on the basis of how well each group of students (those in the regular classroom program and those who received Chapter 1 services) performed on individual test objectives or skill clusters. Specifically, using the mastery/non-mastery determination made for each student on each objective or skill cluster, the committee would calculate the following:

- **For those student with total scores in the bottom group of interest and who received Chapter 1 services the preceding year,** the percent of students mastering each objective/skill cluster.

- **For those students with total scores in the bottom group of interest and who did not receive Chapter 1 services over the last year,** the percent of students mastering each objective/skill cluster.

It should be kept in mind that while this paper addresses disaggregation of data for the low scoring students by examining those who received Chapter 1 services, the process could just as easily focus on other types of special services in precisely the same manner.

In addition to disaggregating student level data in order to align district-wide curricula, data can also be examined at the individual school or classroom level. To accomplish this, the committee first conducts steps 1 through 6 as outlined above in order to obtain a picture of the total district's performance. The committee then repeats Step 6 by looking at test data from students in individual buildings or classrooms, rather than across all schools in the district. In order to provide a clearer understanding of the various levels the disaggregation process can take, two applications of the process are included in this paper, and will be used at a later point to further clarify the curriculum alignment process.

Step 7: Interpret the results in view of the programs of interest.

Once the necessary analysis procedures have been completed, the most important activity occurs: interpreting the results in view of the programs of interest. Here, the committee reviews the results of the disaggregation process to determine how well students are doing on a school-wide basis and on a program-by-program basis. The overall intent of this review is to determine whether students are performing at a satisfactory level and, specifically, where each program could be better aligned and improved.

As the committee reviews data by content area -- either district-wide or at the school or classroom level -- its task is to identify objectives or skill clusters where there are performance discrepancies between groups of students; that is, do students demonstrate varying levels of proficiency as a function of the type of educational services they receive? Or, does their test performance relate directly to the buildings in which they receive those services?

As is true with most test data used for program evaluation, the disaggregation process will highlight areas which should be investigated more closely, but will not provide specific information on potential solutions to problems that appear to exist. For example, results of the disaggregation process may indicate that a disproportionate number of students in the Chapter 1 program are not mastering certain reading comprehension skills, even though the Chapter 1 objectives indicate that these skills were taught to students prior to the testing date. A potential problem is highlighted by the disaggregation process, but the committee would have to delve further to determine why this is occurring.

THE PROCESS: APPLICATION 1

Application 1 of the curriculum alignment process was conducted with data from a semi-rural school district in upstate New York. This school district (hereafter, District A) encompasses several communities consisting largely of family-owned farms and small, agriculturally-oriented businesses. Because District A is a cooperative school district serving many rural communities, its 2,000 students are rather homogeneous with respect to educational, economic, and social backgrounds. The district operates very few specially funded education programs, but does provide Chapter 1 reading, writing, or mathematics services to roughly 17% of the students in grades K-6.

Application 1 uses data from a May 1987 administration of a criterion-referenced mathematics test, the administration of which is mandated statewide on an annual basis to all students in grades 3 and 6. The test was developed based on the current New York State mathematics curriculum, and remedial standards have been established (50% of the 65 items correct reflects mastery), below which low scoring students must receive further diagnosis and remediation. Students in District A generally perform very well on this state-mandated test. In 1987, only one of the 137 students who took the 3rd grade test scored below the state reference point. Because of these high scores, the district has not relied on this test to provide all of the information needed to evaluate its mathematics programs. Instead, the district reports the results in the usual manner, using students' total scores simply as a benchmark for mathematics proficiency.

The items on this criterion-referenced test are grouped into five major mathematics skill clusters. However, the state does not provide interpretations to districts based on how students performed in each of these clusters. Because the statewide reference point is stated only in terms of students' total scores, and because District A consistently performs well using this metric, there is little incentive for the district to spend a significant amount of time disaggregating data from this test in any substantive way. As a result, the district really has no clear picture with regard to how well students perform on the different skill clusters which compose the test.

When District A was asked to assist in experimenting with the curriculum alignment process, the idea of using this criterion-referenced test as the focal point for data disaggregation appealed to them for two reasons: (1) no one in the district had ever systematically analyzed data from this test; and (2) although the district's math curriculum was theoretically

tied very closely to the state syllabus, no one had ever determined whether this was in fact true for each of the five skill areas assessed on the test. The state math test would provide the district with this information.

Application 1 was carried out primarily to determine the feasibility of implementing the disaggregation process using "real" test data. Therefore, there existed no particular need to organize school district staff into a curriculum alignment committee as described in Step 1. Instead, Application 1 began with the implementation of Step 2, with the disaggregation process carried all the way through Step 7.

Both the Chapter 1 program and the regular school program in District A use the instructional objectives and the scope and sequence provided in a popular, commercially available mathematics textbook program. This program is used in grades K to 8. Teachers and administrators in District A are adamant in stating that the textbook program closely parallels the state mathematics syllabus at each grade level, and that the scope and sequence is followed very closely in regular classroom instruction.

The Chapter 1 program in District A also relies on the same mathematics program and its sequence of objectives, but provides more individualized instruction. Chapter 1 instruction in this district exists to get students functioning at proficiency levels comparable to their non-Chapter 1 peers -- and therefore, theoretically anyway, concentrates on the same instructional objectives. One might assume that, because both programs teach to the same objectives, a disaggregation process focusing on mathematics proficiency toward the end of a school year would yield no surprises. But such is not the case, as will be discussed later.

Table 1 summarizes the application of Step 2 of the disaggregation process by listing the regular and Chapter 1 program objectives, as well as when they are taught to students. It should be pointed out, however, that Table 1 is illustrative, and presents only a few of the objectives; the entire listing produced by a curriculum alignment committee would of course be much more comprehensive, encompassing virtually every mathematics skill taught in Grade 3. As would normally be expected, District A's full listing of instructional objectives showed that the Chapter 1 program indicates more individualization in regard to when objectives are covered with students. But it is was also apparent that Chapter 1 students learn the objectives in the same sequence as do student in the regular program.

Table 2 provides the results of grouping related test items by test objective. In this case, items on the 3rd-grade test were grouped into the five skill clusters which reflect the organization of the state's mathematics syllabus. The code numbers in Tables 1 and 2 have been added simply to abbreviate references to curriculum objectives or the skill areas covered on the test.

Table 3 indicates the results of linking each test objective to the related curriculum objective. As with Table 1, the district would carry this process through until all of the curriculum objectives were matched with an assessment objective or skill cluster. As described in Step 4 of the disaggregation process, this step provides useful information in and of itself, since the committee reviewing the match between curriculum and

assessment objectives will likely discover some areas of instruction that are not being assessed on the test. Likewise, the process could also yield some skills that are being assessed that simply are not taught to students prior to test administration. What this part of the curriculum alignment process does not show, however, is the extent to which students are learning particular skills as a function of the educational services they receive, or of the schools in which they receive those services. The next few steps in the disaggregation process provides this information.

After District A's curriculum and assessment objectives were matched, attention was then turned to test data. Total raw scores (# of items correct) were calculated for each student, and a chart was made listing each student's performance (correct or incorrect) on each of the test's 65 items. Then using the statewide reference point (50% correct), a determination was made as to whether each student passed or did not pass each of the five skill areas on the test. As discussed earlier, District A students scored very well on the test, and the resulting distribution of total scores was quite narrow. Because of this narrow range of scores, the total scores were divided into two groups: top half and bottom half.

Next, for both halves of the range, the total percent of students **passing each skill cluster** was calculated. The bottom half was then disaggregated further to determine the percent of Chapter 1 students passing each skill cluster, and the percent of students in the regular classroom program passing each skill cluster. The results of these two steps are presented in Table 4.

When reviewing the results of the first stage of the disaggregation process (see Table 4), it became apparent that Skill Cluster 3 indicated a potential problem area for students in the bottom half of the group. In fact, only 66% of students in the bottom half mastered this skill cluster. When the data were analyzed further -- by students' program participation -- a much greater discrepancy became apparent: while 70% of the students in the regular classroom program mastered this skill cluster, while only 36% of the Chapter 1 students mastered it. Yet, according to information provided by District A as to when students were taught this skill cluster, the Chapter 1 students should have learned the skills at the same time as their non-Chapter 1 peers.

What are the implications for program improvement using this type of disaggregation process? First, if one looks only at overall scores, most of the 120 students in District A will move on through the program without further intervention. Since most of the students scored above the state reference point, the assumption is made that they have mastered enough prerequisite math skills to go on to upper level skills. Yet, if one focuses only on students who scored in the bottom half of the total group, the disaggregation process indicates that 34% of these students have not learned the skills necessary to pass Skill Cluster 3 (which is information not provided back to districts by the state). Since this skill cluster is deemed important enough to be assessed on the test with 8 items, one might ask whether 34% of the students should in fact move on to upper level skills without first having mastered this skill area.

Second, based on the information about when various skills are taught in both the Chapter 1 and regular program, scores for students in both of these groups should reflect about the same passing rates for Skill Cluster 3. Yet 64% of the Chapter 1 students who fell in the bottom half did not learn these skills, as compared to 30% of the regular program students who also scored in the bottom half. If Skill Cluster 3 is a prerequisite area for future mathematics skills, these ex-Chapter 1 students will be at a potentially distinct disadvantage as they advance into higher level math instruction.

While the results of this disaggregation do not provide any answers, they certainly point to some potential problems. Why are 66% of the bottom scoring students not mastering Skill Cluster 3? Keep in mind that 100% of these students actually scored above the state reference point and therefore passed the test. If teachers were given only the overall scores for these students, they would probably assume that this particular skill cluster had also been passed; after all, the students passed the entire test. In addition, why did so many of the Chapter 1 students not learn the skills necessary to master Cluster 3? After all, they are in a more individualized program, are provided with the same instructional materials, and are theoretically taught the same skills. The need to answer questions of this nature would be the next step for a curriculum alignment committee, and the answers would most likely lead to specific program improvement activities.

THE PROCESS: APPLICATION 2

Application 2 of the curriculum alignment process was conducted with data from a second school district in upstate New York. Situated about 30 minutes from 2 of New York's five largest cities, District B is largely a bedroom community whose residents commute daily to these cities to work. While roughly 80% of the residents work outside the community, most of the remaining residents represent family owned and operated dairy farms. Because of this mix of backgrounds, the 4,800 students in the District B school system represent a variety of educational, economic, and social backgrounds.

Like District A, District B participated in the curriculum alignment process because it was interested in having disaggregated test information that would assist in guiding substantive program improvement activities. District B also wanted to examine its 3rd grade mathematics program and, like District A, was particularly interested in looking at data representing students in the regular classroom program and in the Chapter 1 program.

However, District B is committed to using norm-referenced test data for purposes of program improvement, and was therefore interested in using the math subtest of its annually administered survey battery for the disaggregation process. This test, which is administered to all students in grades 1 through 8, provides a variety of scores and other types of norm-referenced information back to the school district.

Tables 5, 6, and 7 provide information equivalent to Tables 1, 2, and 3 in the discussion of Application 1. Table 5 summarizes the mathematics curriculum objectives used at the 3rd grade level in District B, and provides an index of when each skill is taught. In short, the objectives are

identical to those provided in the New York State Mathematics Syllabus for students at this grade level. District B also believes that students who receive Chapter 1 math services learn essentially the same things each year as do their non-Chapter 1 counterparts. The only difference is the amount of time teachers spend teaching certain skills, and the degree of individualization evident in the Chapter 1 program. In other words, regardless of whether students receive regular classroom instruction or whether their classroom instruction is supplemented by Chapter 1 services, they all should be learning the same math skills. Thus, one list of objectives represents both the regular and the Chapter 1 program in District B.

Table 6 presents the 10 skill clusters into which items from District B's norm-referenced mathematics subtest are grouped by the test scoring service. These skill clusters represent the unit of analysis used to disaggregate student-level test data in Application 2. As in Table 2, code numbers have been assigned to each of the skill clusters to facilitate future use by the curriculum alignment committee.

Table 7 illustrates how the 10 skill clusters of the test relate to District B's 3rd grade curriculum objectives. Here, the code numbers under the "Test Objective Code #" heading reflect how the curriculum objectives were assigned to the test's more global skill areas.

The disaggregation process for Application 2 again points to some areas that warrant further investigation, both on a district-wide and school-by-school basis. Considering first the results of the disaggregation on a district-wide basis (see Table 8), it is apparent that students falling in the bottom half of the group are having difficulty in all areas except Skill Cluster 6 (but even here, only 76% of the low-scoring students mastered this skill area). Furthermore, the percent of students in this group who mastered Skill Areas 1, 3, 8, and 9 is extremely low.

Based on the further disaggregation of the bottom half of the students by program participation (see the bottom portion of Table 8), it appears that there are at least two Skill Clusters (1 and 5) in which the Chapter 1 students scored noticeably higher than their non-Chapter 1 peers, and in fact higher than the bottom half on a district-wide basis. Looking more closely at Skill Cluster 1, 30% of the bottom half students in Chapter 1 mastered most of the items as compared to 16% in the regular program and 21% on a district-wide basis. Skill Cluster 3 points to a larger discrepancy, with 80% of the bottom half students in Chapter 1 passing this portion of the test, while only 37% of their peers in the regular program and 52% of the bottom half district-wide passing this skill area.

The test data in Application 2 were also disaggregated on a school-by-school basis (see Table 9). The percent of students passing each of the various skill clusters was consistently lower in School A than either of the other two schools in the district, with Skill Areas 3, 5, and 9 standing out as reflecting a much lower percent of students passing. Students in School B appear to score very close to the district-wide results. As for School C, this series of disaggregated test results point only to Skill Cluster 9 as a potential problem area (although lower than Building B's scores, Building C's performance in this skill area still approximates district-wide performance and exceeds Building A's performance).

Table 10 presents a further disaggregation by top scoring and bottom scoring students in each of the school buildings. Considering first the top half scoring students, the results for School A are consistently lower for Skill Clusters 3, 5, and 9. Similarly, the results for School C show a lower number of the top half students passing Skill Area 9.

But when viewing the results of the disaggregation process for students in the bottom half of the group, the pattern becomes more diverse (see the bottom half of Table 10). For School A, Skill Clusters 3 and 5 continue to stand out as potential areas of concern. However, students in School A also appear to score higher that their peers in other schools on some of the other Skill Clusters, including 1, 6, 7, 8, 9, and 10. This pattern is especially apparent for Skill Clusters 7 through 10. Students in School B, however, performed substantially better than students in other buildings regarding Skill Cluster 2. In addition, the strongest results for the bottom half scoring students in School C appear to be in Skill Clusters 3, 4, 5, and 6, with Skill Clusters 7, 8, and 9 reflecting possible problem areas.

District B's test results underwent further disaggregation by building and program participation (see Table 11). Unfortunately, at this point the number of students in each of the various cells is quite small, but the process still yields some interesting patterns of strengths and weaknesses by both school and program participation. For example, Chapter 1 students in School A appear to do better on Skill Clusters 1, 7, 8, 9, and 10 than their peers in other Chapter 1 programs, and when their data are compared to the bottom scoring students in the regular program. Similarly, the Chapter 1 students in Schools B and C appear to do better on Skill Cluster 5 than Chapter 1 students in School A or in the regular program.

For the purpose of this particular application, one further disaggregation was conducted using the test results from School A (see Table 12). With regard to the bottom scoring students in School A, those who participated in the Chapter 1 program performed better on Skill Clusters 1, 5, 7, and 9 than their bottom scoring peers in the regular program, but scored somewhat lower than these other students on Skill Cluster 3.

In interpreting the results of this disaggregation process for program improvement purposes, very similar types of questions arise as with Application 1. On a district-wide basis, according to the information supplied by District B as to when certain math skills are taught, all of the students should have the skills necessary to pass all skill areas by the time the test is administered. However, test results for the bottom scoring students reflect potential problems on 9 of the 10 skill clusters covered on the test. On a district-wide basis, some students will be moving on to instruction in more advanced math skills without having first demonstrated mastery of the requisite skills, pointing to a need to provide additional services to these students.

One might also want to determine what the Chapter 1 program is doing to teach certain skill areas where students scored particularly well. In Skill Cluster 5 (Table 11), for example, all of the Chapter 1 students in Schools B and C demonstrated mastery, while fewer than half of the students in the regular classroom program accomplished this. Is the Chapter 1 program relying on some type of a unique instructional strategy or different

textbook program that might contribute to student success in this skill area?

District B's data disaggregation also raises a number of questions concerning the performance of low-scoring students in individual schools -- both across educational programs and within them. For example, why do students scoring in the bottom half -- in both the regular classroom and Chapter 1 programs in School B (Table 10) -- perform poorly on Skill Clusters 8, 9, and 10? While the district in general performs well in these areas (Table 8), Table 10 shows that students in School B demonstrate consistently lower scores in all of these areas and in both types of programs. For school improvement purposes, this question should lead the committee to explore mathematics instruction in School B. However, this finding should also point the committee to look more closely at instruction in these skill areas provided district-wide to poor performing students; especially since this group of students performed relatively poorly on most of these skills in each of the three schools.

Remember, too, that District B claimed that its math curriculum was aligned with its math test. The performance among certain groups of students, particularly those who scored in the lower half and who receive math instruction in Schools A and B, should lead the committee to review the relationships between what is taught and what is tested in each of its schools. Do different schools teach the same skills? Are the same skills being covered by the time the math test is administered? Are students really learning the same math skills, regardless of whether they receive Chapter 1 services? While the disaggregation process does not answer these questions directly, it does point to specific areas in need of further investigation.

CONCLUSIONS

Curriculum alignment through the disaggregation of test data can, as a process in and of itself, serve a number of purposes for any district interested in program improvement. In fact, simply implementing the process itself can be considered a program improvement activity. If the process is followed as described in this paper, certain events directly related to program improvement must occur. These events and their contribution to program improvement include:

- **The use of a working school-wide committee for each content area of interest.** The coordination of a committee across programs promotes the concept that the effective teaching of content skills is not something that occurs in isolation, but rather should be a common concern across programs. The use of a working committee across programs encourages coordination toward common goals.

- **The identification of skills/objectives actually taught to students, as well as when instruction is provided for each area.** The identification of what is taught in each program and when certain skills are taught leads program staff to clarify their goals and ensure that students are

actually being provided with adequate instruction in the requisite skills. Reviewing these skills across programs is the first step in curriculum alignment.

- **The test review process.** The process of reviewing test items and grouping related items into content areas requires those involved in the process to take a close look at the skills assessed on the test. It is only through a careful review of test items that a true picture of the level at which skills are tested and the emphasis placed on each skill area can actually be obtained.

- **Linking test objectives to program objectives.** It is at this point that the committee can identify discrepancies between what is taught in various programs and what is measured by the test. A mismatch at this point between what is taught and what is tested would point to the need to either realign the curriculum to match the test, or to select another test which more appropriately measures the skills actually taught. (As it turned out in Application 1, there was a large discrepancy between the depth at which the students were tested in regard to fractions and the amount of instruction received in that area -- highlighted graphically through extremely poor test results in that skill area.)

- **Establishing the minimum passing level for the test and related skill areas/objectives being assessed.** The need to establish these minimum passing levels for use in the disaggregation process causes members of the committee to seriously examine the standards which they consider to represent "acceptable" performance. Because this must be done across programs, members must come to some common agreement regarding this minimum standard.

- **The disaggregation process.** The flexibility of the disaggregation process allows the committee to analyze test scores at various levels (e.g., for the entire district, by school, by programs, by class) of interest. Furthermore, the student group of particular interest can be adjusted as needed, by disaggregating based on top half/bottom half, bottom third, or even by disaggregating by student scores below the overall mastery score (e.g., 70%, 80%).

As discussed elsewhere in this paper, the disaggregation process cannot be conducted without administrative support, especially support that provides the time for cross-program committees to work together, and in the provision of the resources necessary for disaggregating test results.

In addition to the process itself, the results of the disaggregation will provide direction for curriculum alignment and program improvement activities. The types of information obtained as a result of the disaggregation process include the following:

- **The presence or lack of coordination and alignment across any special programs of interest and the regular program.** The level of coordination regarding skills as they are taught in the various programs will be reflected both in the analysis of objectives and in the resulting test scores. Members of the committee will be able to identify skills which are not taught in specific programs or at certain levels, and subsequently make recommendations regarding whether programs of instruction should be revised.

- **Students' areas of weaknesses within and across programs.** The disaggregation process requires that test scores be reviewed for passing/not passing in relation to specific skill areas, rather than overall scores. This is done at a variety of levels of interest, such as the entire district, by special program, by school building, or by any other disaggregation units of interest. These results will point directly to skill areas which students are and are not mastering. Based on this information, the committee must make certain recommendations, such as whether there is a need for specific program improvement activities targeted at improving student performance over specific skill areas, on a district-wide, program-wide or school-wide basis.

- **Students' areas of strengths across and within programs.** In a similar manner, the disaggregation process can point to specific strengths within programs. Based on this information, the committee could further review program activities to identify and describe effective practices which contribute to good student performance. This information could then be used as a basis for replicating success in other programs.

- **The presence or lack of consistency across building within a common program.** It is often assumed that a district-wide program is implemented in the same manner, at the same level, and with the same results across buildings. The results of the disaggregation process by building or by special program within a variety of buildings will either confirm this assumption or point to discrepancies which should be further investigated.

- **Unidentified problems as reflected by low test scores highlighted through the disaggregation process.** The disaggregation process itself may identify problems for which there is no readily available answer -- problems which require further investigation. For example, data disaggregation may point to a specific skill area that is not being learned by students who participate in a certain program. Yet, the program objectives may indicate that the skills are being taught, and the review of test items may confirm that the test assesses the appropriate

skills. This discrepancy would point to a need for a further review of the actual instructional process and materials being used to teach these specific skills in order to ensure that students are actually being taught the same skills, at the same level of depth, prior to testing. A variety of reasons for the low scores may be identified, ranging from students not receiving adequate instruction, to students being taught the skills in a somewhat different way than the approach used to test these same skills. The answers to "Why the low scores?" may become apparent only after further, more detailed program review activities are conducted.

The interpretation of the disaggregation results by all members of the committee, across programs also promotes the overall desirable goal of coordination and communication across programs. Examining the various disaggregation results and making recommendations as a committee promotes the concept that school improvement and student learning are common goals, not ones specific to isolated programs.

As with any process, there are limitations that should be taken into consideration prior to making the decision to undertake disaggregation activities. As has already been mentioned, the process is time-consuming and requires the commitment of staff and resources in order to conduct the various steps. Furthermore, staff directly involved on the committee, others who work within related programs, and district administration must be willing to use the resulting information as appropriate and, where necessary, conduct follow-up investigations to pinpoint specific changes for program alignment and improvement purposes. It must be acknowledged that the disaggregation process may point to additional questions which must be answered before any changes are instituted.

The disaggregation process described here also requires written statements describing the skill areas or objectives taught in each program, as well as when that instruction is provided. Programs which find that they do not have well articulated objectives will be unable to conduct the disaggregation process. An additional requirement is the availability of standardized test results suitable for the disaggregation process. Members of the committee must have access to the test and its related objectives in order to link test objectives to program objectives. Furthermore, test results which can be scored by skill areas and then disaggregated by unit of interest (e.g., district, school, special program) must also be available.

The usefulness of the results of the disaggregation process may also be limited by small numbers of students at some levels of disaggregation. Where this occurs, care should be taken to interpret the results accordingly and not making decisions based on this information alone. Should small numbers of students occur as data for certain groups of students are examined, the results should indeed be considered preliminary in nature, indicating only possible trends and the need for further investigation as appropriate.

RECOMMENDATIONS

Based on the pilot try-outs of this process, it appears that disaggregating test results in the manner described can provide special programs and entire school districts with some relevant and interesting information for curriculum alignment and program improvement activities. Special programs which have as their goal providing students with the skills necessary to succeed in regular classroom instruction should be especially interested in this type of disaggregation process -- the results can point directly to weaknesses as reflected by test scores of those students in the program, when compared to their mainstream peers. School districts interested in the overall quality of their program, as well as the relationship of the various parts to the whole, would certainly benefit from conducting the disaggregation process.

Due to the flexibility of the process, it is suggested that those who do undertake the test disaggregation activities do so with careful planning and discussion, especially with regard to determining the criterion level to be used for classifying students as passing/not passing each skill area and the overall test. Similar care should be taken in deciding how the actual disaggregation of test results will be done (e.g., top half/bottom half, bottom third, below 80%) and the units which will be used for the disaggregation process (e.g., by school, by program, within school by program). How the disaggregation process is conducted, needless to say, will affect how the results can be interpreted.

Finally, the results should be interpreted in view of the limitations of the entire process, with special attention paid to the number of students on which conclusions and recommendations are made. While in some cases the results may point clearly to areas in which improvements can be implemented, it is equally likely that the results may point only to further questions which must be answered before any curriculum alignment or program improvement activities can be undertaken.

TABLE 1

SUMMARY OF DISTRICT A's MATHEMATICS CURRICULUM OBJECTIVES

Regular Classroom			Chapter 1	
Code #	When Taught	Objective	Code #	When Taught
A	Spring/Gr. 1	Recall addition and subtraction facts related to sums through 10.	AA	Spring/Gr. 1
B	Spring/Gr. 1	Recall addition and subtraction facts related to sums through 18.	BB	Spring/Gr. 1
C	Spring/Gr. 1	Add three 1-digit numbers using addition facts.	CC	Spring/Gr. 1
D	Fall/Gr. 1	Solve word problems using the 5-point checklist and cumulative computational skills.	DD	Fall/Gr. 1
E	Fall/Gr. 1	Read, write, and order numbers through 3 digits.	EE	Fall/Gr. 1
F	Spring/Gr. 1	Estimate sums by rounding to the nearest ten, hundred, or dollar.	FF	Spring/Gr. 1
G	Fall/Gr. 2	Measure length to the nearest centimeter; est. length using centimeters, meters, and kilometers.	GG	Fall/Gr. 2
H	Fall/Gr. 2	Find perimeter by adding the lengths of sides.	HH	Fall/Gr. 2
I	Spring/Gr. 2	Make and interpret tally charts and bar graphs; interpret picture graphs.	II	Spring/Gr. 2
J	Spring/Gr. 2	Use number pairs to locate and name points on coordinate graphs.	JJ	Spring/Gr. 2
K	Spring/Gr. 2	Write fractions for parts of regions or sets, using related pictures.	KK	Spring/Gr. 2
L	Spring/Gr. 2	Compare fractions, using related pictures	LL	Spring/Gr. 2

TABLE 2

SUMMARY OF DISTRICT A's MATHEMATICS ASSESSMENT OBJECTIVES

Assigned Code #	Skill Cluster Name	Item Numbers
1	Numbers and Numeration	1 - 14
2	Operations with Whole Numbers	15 - 37
3	Operations with Fractions	38 - 45
4	Probability and Statistics	46 - 49, 51, 53, 55
5	Geometry and Measurement	50, 52, 54, 56 - 65

TABLE 3

DISTRICT A's MATH CURRICULUM ALIGNED WITH THE STATE MATH TEST

Curriculum Code #	Objective	Test Objective Code #
A,AA	Recall addition and subtraction facts related to sums through 10.	1
B,BB	Recall addition and subtraction facts related to sums through 18.	1
C,CC	Add three 1-digit numbers using addition facts.	2
D,DD	Solve word problems using the 5-point checklist and cumulative computational skills.	2
E,EE	Read, write, and order numbers through 3 digits.	1
F,FF	Estimate sums by rounding to the nearest ten, hundred, or dollar.	2
G,GG	Measure length to the nearest centimeter; est. length using centimeters, meters, and kilometers.	5
H,HH	Find perimeter by adding the lengths of sides.	5
I,II	Make and interpret tally charts and bar graphs; interpret picture graphs.	4
J,JJ	Use number pairs to locate and name points on coordinate graphs.	4
K,KK	Write fractions for parts of regions or sets, using related pictures.	3
L,LL	Compare fractions, using related pictures.	3

TABLE 4

DISAGGREGATION OF DISTRICT A's TEST RESULTS

Analysis for all Students (n=120):

	Percent Mastering Each Skill Cluster				
	1	2	3	4	5
Top Half (n=82)	100	100	96	99	100
Bottom Half (n=38)	100	92	66	97	95

Analysis for Bottom Half by Program Participation (n=38):

	Percent Mastering Each Skill Cluster				
	1	2	3	4	5
Regular Program (n=27)	100	93	70	100	93
Chapter 1 (n=11)	100	91	36	91	100

TABLE 5
SUMMARY OF DISTRICT B's MATHEMATICS CURRICULUM OBJECTIVES

Regular Classroom			Chapter 1	
Code #	When Taught	Objective	Code #	When Taught
A	Fall/Gr. 3	Use cardinal numbers through 10,000 and ordinal numbers through 500.	AA	Fall/Gr. 3
B	Fall/Gr. 3	Reinforce the understanding of numbers to 10,000 by using a variety of place value models.	BB	Fall/Gr. 3
C	Spring/Gr. 3	Use activities with money notation to explore the meaning of the places to the right of the decimal point.	CC	Spring/Gr. 3
D	Fall/Gr. 3	Develop skill in adding two or more two- or three-digit numbers totaling less than 10,000, regrouping or exchanging when necessary.	DD	Fall/Gr. 3
E	Spring/Gr. 3	Develop skill and quick numerical responses to division facts under 100, relating them to multiplication.	EE	Spring/Gr. 3
F	Fall/Gr. 3	Note the fact that the product of any number times 1 is the number.	FF	Fall/Gr. 3
G	Fall/Gr. 3	Master subtraction facts to 25.	GG	Fall/Gr. 3
H	Spring/Gr. 3	Study the commutative property in sentences and multiplication tables.	HH	Spring/Gr. 3
I	Spring/Gr. 3	Review the meaning of unit fractions, including 1/8.	II	Spring/Gr. 3
J	Fall/Gr. 3	Develop an understanding of the relationship between fractions and division.	JJ	Fall/Gr. 3
K	Spring/Gr. 3	Add and subtract decimal fractions to tenths.	KK	Spring/Gr. 3
L	Spring/Gr. 3	Use tree diagrams to study possible combinations.	LL	Spring/Gr. 3
M	Fall/Gr. 3	Study time to five- and one-minute intervals.	MM	Fall/Gr. 3
N	Spring/Gr. 3	Find the perimeter of polygons, using rulers.	NN	Spring/Gr. 3
O	Spring/Gr. 3	Study the properties of solid figures (spheres, cubes, pyramids,...), noting verticles, line segments, edges, and angles.	OO	Spring/Gr. 3

TABLE 6

SUMMARY OF DISTRICT B's MATHEMATICS ASSESSMENT OBJECTIVES

Assigned Code #	Skill Cluster Name	Number of Items
	CONCEPTS OF NUMBER	
1	Whole Numbers and Place Value	18
2	Fractions	5
3	Operations and Properties	11
	MATH COMPUTATION	
4	Addition: Whole Numbers	12
5	Subtraction: Whole Numbers	9
6	Multiplication: Whole Numbers	12
7	Division: Whole Numbers	9
	MATH APPLICATIONS	
8	Problem Solving	18
9	Geometry/Measurement	14
10	Graphs and Charts	6

TABLE 7

DISTRICT B's MATH CURRICULUM ALIGNED WITH ITS NORM-REFERENCED MATH TEST

Curriculum Code #	Objective	Test Objective Code
A,AA	Use cardinal numbers through 10,000 and ordinal numbers through 500.	1
B,BB	Reinforce the understanding of numbers to 10,000 by using a variety of place value models.	3
C,CC	Use activities with money notation to explore the meaning of the places to the right of the decimal point.	3
D,DD	Develop skill in adding two or more two- or three-digit numbers totaling less than 10,000, regrouping or exchanging when necessary.	3, 4
E,EE	Develop skill and quick numerical responses to division facts under 100, relating them to multiplication.	7
F,FF	Note the fact that the product of any number times 1 is the number.	6
G,GG	Master subtraction facts to 25.	5
H,HH	Study the commutative property in sentences and multiplication tables.	3, 6
I,II	Review the meaning of unit fractions, including 1/8.	2
J,JJ	Develop an understanding of the relationship between fractions and division.	2
K,KK	Add and subtract decimal fractions to tenths.	2
L,LL	Use tree diagrams to study possible combinations.	10
M,MM	Study time to five- and one-minute intervals.	1, 3
N,NN	Find the perimeter of polygons, using rulers.	9
O,OO	Study the properties of solid figures (spheres, cubes, pyramids,...), noting verticles, line segments, edges, and angles.	9

TABLE 8

DISAGGREGATION OF DISTRICT B's TEST RESULTS

Analysis for all Students (n=176):

	Percent Mastering Each Skill Cluster									
	1	2	3	4	5	6	7	8	9	10
Top Half (n=147)	88	92	88	93	88	95	95	92	86	95
Bottom Half (n=29)	21	66	21	55	52	76	66	10	7	55

Analysis for Bottom Half by Program Participation (n=29):

	Percent Mastering Each Skill Cluster									
	1	2	3	4	5	6	7	8	9	10
Regular Program (n=19)	16	63	21	58	37	74	63	11	5	63
Chapter 1 (n=10)	30	70	20	50	80	80	70	10	10	40

TABLE 9

DISTRICT B's DATA DISAGGREGATED ACROSS THE DISTRICT AND BY BUILDING

	Percent Mastering Each Skill Cluster									
	1	2	3	4	5	6	7	8	9	10
District-wide (n=176)	77	87	77	87	82	92	90	78	73	88
School A (n=69)	71	80	59	80	68	91	88	71	65	87
School B (n=53)	83	92	89	92	87	92	91	81	83	87
School C (n=54)	80	91	87	91	96	93	93	85	74	91

TABLE 10

DISTRICT B's DATA DISAGGREGATED BY BUILDING AND PROGRAM

Analysis for all Students Scoring in the Top Half (n=147):

	Percent Mastering Each Skill Cluster									
	1	2	3	4	5	6	7	8	9	10
School A (n=51)	86	86	76	92	78	96	94	90	84	94
School B (n=48)	92	94	96	96	90	98	96	90	92	94
School C (n=48)	88	94	92	92	98	92	96	96	83	96

Analysis for all Students Scoring in the Bottom Half (n=29):

	Percent Mastering Each Skill Cluster									
	1	2	3	4	5	6	7	8	9	10
School A (n=18)	28	61	11	44	39	78	72	17	11	56
School B (n=5)	0	80	20	60	60	40	40	0	0	20
School C (n=6)	17	67	50	83	83	100	33	0	0	50

TABLE 11

DISTRICT B's DATA DISAGGREGATED BY BUILDING: BOTTOM HALF STUDENTS ONLY

Analysis for Students in the Regular Classroom Program:

	Percent Mastering Each Skill Cluster									
	1	2	3	4	5	6	7	8	9	10
School A (n=13)	15	62	15	46	31	77	69	15	8	69
School B (n=3)	0	67	0	67	33	33	33	0	0	33
School C (n=3)	33	67	67	100	67	100	67	0	0	67

Analysis for Students in the Chapter 1 Program:

	Percent Mastering Each Skill Cluster									
	1	2	3	4	5	6	7	8	9	10
School A (n=5)	60	60	0	40	60	80	80	20	20	60
School B (n=2)	0	100	50	50	100	50	50	0	0	0
School C (n=3)	0	67	33	67	100	100	67	0	0	33

TABLE 12

SCHOOL A's DATA FULLY DISAGGREGATED

Analysis for all Students in School A (n=69):

	Percent Mastering Each Skill Cluster									
	1	2	3	4	5	6	7	8	9	10
Top Half (n=51)	86	86	76	92	78	96	94	90	84	94
Bottom Half (n=18)	28	61	11	44	39	78	72	17	11	56

Analysis for Bottom Half Students in School A by Program (n=18):

	Percent Mastering Each Skill Cluster									
	1	2	3	4	5	6	7	8	9	10
Regular Program (n=13)	15	62	15	46	31	77	69	15	8	69
Chapter 1 (n=5)	60	60	0	40	60	80	80	20	20	60